

CLAIMS

1. A lithium ion capacitor comprising a positive electrode, a negative electrode and an aprotic organic solvent solution of a lithium salt as an electrolytic solution, wherein a positive electrode active material is a material capable of reversibly supporting lithium ions and/or anions, a negative electrode active material is a material capable of reversibly supporting lithium ions, and the potential of the positive electrode is at most 2.0 V after the positive electrode and the negative electrode are short-circuited, characterized in that each of a positive electrode current collector and a negative electrode current collector has pores penetrating from the front surface to the back surface, the positive electrode and the negative electrode are alternately laminated with a separator interposed therebetween to constitute an electrode unit, the cell is constituted by at least two such electrode units, a lithium ion supply source is disposed between the electrode units, and lithium ions are preliminarily supported by the negative electrode and/or the positive electrode by electrochemical contact of the lithium ion supply source with the negative electrode and/or the positive electrode.
2. The lithium ion capacitor according to Claim 1, wherein a lithium ion supply source is further provided on the outside of one or both of the electrode units at the end of the cell.

3. The lithium ion capacitor according to Claim 1 or 2, wherein a current collector of the lithium ion supply source has pores penetrating from the front surface to the back surface.

5 4. The lithium ion capacitor according to Claim 1, 2 or 3, wherein the lithium ion supply source is formed in such a manner that the lithium ion supply source is pressure bonded on one side or both sides of the current collector.

10 5. The lithium ion capacitor according to any one of Claims 1 to 4, wherein the outermost portion of the electrode unit is a separator, and the inside thereof is the negative electrode.

6. The lithium ion capacitor according to any one of

15 Claims 1 to 5, wherein the positive electrode active material is any one of (a) an activated carbon, (b) an electrically conductive polymer and (c) a polyacenic organic semiconductor (PAS) which is a heat-treated aromatic condensed polymer having a polyacenic skeleton

20 structure with an atomic ratio of hydrogen atoms/carbon atoms between 0.50 and 0.05.

7. The lithium ion capacitor according to any one of

Claims 1 to 6, wherein the negative electrode active material is any one of (a) graphite, (b) hardly

25 graphitizable carbon and (c) a polyacenic organic semiconductor (PAS) which is a heat-treated aromatic condensed polymer having a polyacenic skeleton structure

with an atomic ratio of hydrogen atoms/carbon atoms between 0.50 and 0.05.

8. The lithium ion capacitor according to any one of Claims 1 to 7, wherein the outside of the electrode units 5 is fixed with a tape.

9. The lithium ion capacitor according to any one of Claims 1 to 8, wherein the negative electrode active material has a capacitance per unit weight at least three times that of the positive electrode active material, and 10 the weight of the positive electrode active material is larger than the weight of the negative electrode active material.